others to the works of foreigners add greatly to the usefulness of the book for more advanced students.

The sedimentary rocks are divided into *arenaceous, argillaceous, calcareous* and *pyroclastic* kinds. Under the first division the general terms are defined, and the characters of the derived grains and of the authigenous constituents are discussed separately. In this way the general characteristics of all arenaceous rocks are given rather than the specific character of any one kind of rock.

In the chapter on argillaceous rocks the general definitions are first given, then the characters of the constituent minerals, followed by that of the structure. The description of illustrative occurrences serves to supply the need of some definite picture of different kinds of these rocks. The treatment of calcareous rocks is admirable for so condensed a statement. It deals first with the source and composition of these rocks, then the structure of organic fragments; followed by oolitic structure, the character of the matrix, and of deep-sea calcareous deposits. Finally metasomatic changes are described, and British examples cited. References to the literature of the subject are numerous and valuable. Pyroclastic rocks are briefly treated. Deposits due to chemical or to organic agencies are described in a few short paragraphs.

Under the head of metamorphism the author discusses the general principles of the subject, and then describes the changes produced by thermal metamorphism upon the different kinds of sedimentary rocks, and upon igneous rocks and the crystalline schists. This is followed by an account of the effects of dynamic metamorphism upon the minerals and structures of rocks. Very little space is devoted to the petrographical description of the various kinds of crystalline schists, which are grouped under the heads of crystalline schists, gneiss, granulites and eclogites. The basis of classification is structure.

The book shows careful preparation, and although the reviewer has taken exception to some features of it, he would recommend it to all those beginning the study of petrology. J. P. J.

Boletin de la Comision Geológica de México, No. 1; Fauna fossil de la Sierra de Catorce, San Luis Potosi. By ANTONIO DEL CASTILLO and JOSE G. AGUILERA; pp. ix + 53, with twenty-four plates, Mexico, 1895.

The authors state that they propose in this work to confirm the existence of the Jurassic system in Mexico, describing the most

characteristic forms that are common in the more accessible localities.

The introductory pages are devoted to a brief review of previous opinions concerning the stratigraphy and age of the formations in the Catorce district, with quotations from the writings of various geologists and travelers who have either visited the region or studied collections from it. The description of the fauna from the body of the work. in which sixty-five species and varieties of invertebrates are described, and nearly all of them are figured. Of these sixty-five forms, five are referred to the Brachiopoda, seventeen to the Lamellibranchiats (including nine Aucellæ), one to the Gastropoda, and forty-two to the Cephalopoda, of which thirty-eight are Ammonites.

The fossils are not all from one horizon, but are distributed through the upper two members of a series, consisting of three groups, as follows, beginning at the base :

1. Metamorphic argillaceous slates, without fossils.

2. Alternating sandstones and marly and argillaceous shales, rich in fossils.

3. Compact gray-ash colored limestones, more or less impregnated with silica, and containing nodules of black flint. The lower part of the group is argillaceous and has a shaly structure. Fossils rare.

The only fossil found in the upper compact limestone is an imperfect ammonite, supposed to be related to *Schloenbachia inflata*, but the calcareous and marly shales at the base of the upper group have yielded five species that are referred to Exogyra, Lucina, Phylloceros and two species of Hoplites. From a comparison of these forms with European species the authors conclude that the upper group probably represents the upper part of the lower Cretaceous, viz., the Aptian and the Albion.

Two divisions are recognized in the middle group (No. 2), of which the upper one, composed of shales and marly sandstones carrying more or less lime, is the principal Aucella bed of the series. The fauna of Aucella recognized are all Russian species, as follows : *Aucella bronni, A. bronni var. lata, A. pallosi,, A. pallosi, var. plicata. A. pallosi var. tenuistriata, A. volgensis, A. fischeriana, A. piriformis and A. terebratuloides.* These species which in Russia characterize various zones in the upper Jurassic and lower Cretaceous, are said to occur together in Mexico in beds, with a total thickness of not more than fifteen feet. Associated with them there are species of Lytoceras, Placenticeras, [?] Pulchellia and Olcostephanus.

The lower division of No. 2 consists of fine-grained sandstones and

argillaceous shales. A single form of Aucella (*A. bronni*) is the only species that it has in common with the overlying division. Its fauna is very rich in Ammonites, especially in the genus Perisphinctes, of which sixteen species are recognized. The other Ammonitic genera represented are Rhacophyllites, Haploceras, Olcostephanus, Hoplites and Aspidoceras.

After discussing the somewhat discordant evidence of the fossils the writers conclude that this lowest fossiliferous bed should be referred to the upper Jurassic, while the upper division of No. 2, in which Aucellæ are so abundant, are believed to be Neocomian.

This important contribution to American Mesozoic palæontology, derives its chief interest from the bearing that it has on the geography of the continent during late Jurassic and early Cretaceous time and on the correlation of the lower Cretaceous fauna of the Pacific coast with that of the Texan region.

It is well known that on the west coast of the United States and British Columbia there is a great thickness of lower Cretaceous strata (Knoxville and Horsetown beds), characterized by an abundant marine fauna. In the Texan region there is another thick series of lower Cretaceous beds (the Comanche series), which is also characterized by a large but totally different marine fauna. The Texan facies of the lower Cretaceous is known to extend into Mexico and over a large part of that country as far west as Arivechi in Sonora. The absence of species common to the two faunas seems to indicate that they lived in different basins without free intercommunication, and this dissimilarity of faunas has prevented exact correlation of the strata.

Catorce, San Luis Potosi, where Castillo and Aguilera obtained the fossils they describe, is near the tropic of Cancer and in longitude 101° East, directly south of the principal Texan area of the Comanche series, and yet the fauna contain none of the characteristic Comanche types, but is related to the Pacific coast faunas. This relationship is especially shown by the abundanee of the genus Aucella which is essentially characteristic of the boreal and Pacific regions, though it is occasionally found outside of those areas. The forms of Aucella, figured from Catorce, though listed under different specific names, can nearly or quite all be duplicated in collections from the Knoxville beds of California. The ammonites also show a number of forms closely related to those of the Knoxville. The lowest fossiliferous zone at Catorce, however, with its numerous species of Perisphinctes, is probably older than the Knoxville. The only suggestion of relationship with the

Comanche series is in the lithological character of the upper limestones, which are described as compact, gray, more or less silicious, limestone with flints, a description that applies equally well to the Caprina limestone, near the middle of the Comanche series. In the almost complete absence of fossils, this limestone cannot now be identified with the Texan formation from the data furnished by the Mexican geologists. Mr. R. T. Hill,[1] however, in an incidental reference to the Catorce region, correlates the so-called "Hippurites" limestone of Mexico, which is probably the same as Castillo and Aguilera's upper limestone, with the Caprina. The same author also refers the lower fossiliferous beds of Catorce to the Trinity division of the Comanche series, but this reference is based on its stratigraphic position rather than either lithological character or faunal contents. From the known distribution of the Comanche series in that region it is at least possible that portions of the Texan and Pacific coast lower Cretaceous faunas may yet be found in direct statigraphic relation with each other in central Mexico.

With the occurrence of the Pacific lower Cretaceous fauna at Catorce, not a great distance from the Gulf of Mexico, and of the Texan or Gulf fauna in Sonora, much nearer to the Pacific, the question as to how the two faunas were kept separate becomes still more difficult. From the data now at hand the most plausible hypothesis seems to be that the sea transgressed the continent, first from one side and then from the other, but never quite crossed the shifting barrier.

T. W. STANTON.

Phylogeny of an Acquired Characteristic. By A. HYATT. Proc. Am. Phil. Soc., Vol. XXXII.

Professor Hyatt's paper "Phylogeny of an Acquired Characteristic," is essentially a contribution to the philosophy of the Neo-Lamarkian school of evolutionists. It is in part a republication in substance of several earlier papers, with the matter now put into a more systematic shape. While primarily biological it possesses great interest for the geologist and perhaps merits a fuller review on that account as it is less likely to fall into his hands.

In the introductory chapter the author lays great stress on the importance of the study of the shells of Mollusca. After speaking of the relation of the shell to the animal, and of the different structures

[1] Am. Jour. Sci., Vol. XLV., 1893, pp. 311, 312, 324.